



DEPARTMENT OF TRANSPORTATION  
HAZARDOUS MATERIALS REGULATIONS BOARD  
WASHINGTON, D.C. 20580

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[49 CFR Part 173]

[Docket No. HM-76; Notice No. 71-3]

TRANSPORTATION OF HAZARDOUS  
MATERIALS

Compressed Gases in Cylinders

The Hazardous Materials Regulations Board is considering amending §§ 173.34 and 173.301 of the Department's Hazardous Materials Regulations to (1) extend the 5-year hydrostatic retest requirements for certain specification 3A and 3AA cylinders to 10-year periods; (2) authorize visual inspection for specification 4E aluminum cylinders in place of periodic hydrostatic retesting; (3) authorize visual inspection for specifications 4B and 4BA cylinders used exclusively in methylamine service; (4) authorize visual inspection for certain cylinders used exclusively in cyclopropane service; (5) apply the periodic hydrostatic retesting and reinspection requirements to specifications 3AX and 3AAX cylinders; (6) remove the service pressure restriction limiting the type of cylinders that may be visually inspected instead of being hydrostatically retested; (7) provide requalification requirements for cylinders that contained a material classified as a "corrosive liquid" prior to recharging with a compressed gas; and (8) to clarify the term "owner" in § 173.301(b) consistent with accepted industry practice and in keeping with the intent of the rule.

These proposals are based, in part, on petitions received from the Compressed Gas Association, and the Bureau of Explosives on behalf of interested shippers. Adoption of the proposals would obviate the need for numerous Special Permits that have been in existence for several years. Upon request from shippers, and receipt of substantial and appropriate cylinder history data from owners of cylinders, Special Permits were issued to various shippers authorizing the shipment of certain dry gases in specifications 3A and 3AA cylinders of not over 125 pounds water capacity for which the 5-year hydrostatic retest period was extended to 10 years. The cylinders were required to be given a visual external inspection prior to each refill to determine that there was no evidence of physical abuse, fire or heat damage, or detrimental rusting or corrosion, and to be subjected to a hammer test and an odor test. Furthermore, a certain percentage of the involved cylinders were required to be subjected to the prescribed periodic hydrostatic retest to verify that there were no significant changes in cylinder life expectancy predicted by the supporting data. It is proposed to limit 10-year hydrostatic retesting to newer cylinders, i.e., cylinders which are not over 35 years old when retested. The reason for this proposal is to require increased monitoring of the effects of age upon a container by requiring more frequent inspection of its condition as it becomes older.

In the compressed gas industry there is a trend to qualify the continued use of pressure vessels, especially cylinders, by visual inspection in place of the traditional periodic hydrostatic retest. Precedence for this has already been established in the regulations where this principle applies to cylinders used exclusively in the use of certain gases, e.g., liquefied petroleum gas, and fluorinated hydrocarbons which are commercially free from corroding components. These provisions were adopted in recognition of the merits of the visual inspection method conducted in accordance with industry's standards described in the Compressed Gas Association's Pamphlet C-6. Also, a petitioner has advised that it is feasible to extend the visual inspection provisions, in place of the hydrostatic retest requirements, to (1) specifications 4B, 4BA, and 4BW cylinders used exclusively in the service of monomethylamine, dimethylamine, or trimethylamine commercially free from corroding components, (2) certain specification cylinders in the 3 and 4 series used exclusively in the service of cyclopropane commercially free from corroding components, and (3) specification 4E aluminum cylinders in the exclusive service of LPG and fluorinated hydrocarbons commercially free from corroding components.

Additionally, to be consistent with other requalification requirements for steel cylinders, it is proposed to extend the periodic hydrostatic retest for specification 4E cylinders used exclusively in the interchangeable service of certain noncorrosive gases, from 5 years to 10 years.

The proposals would also establish qualification, maintenance and use requirements for the larger specifications 3AX and 3AAX cylinders for which construction requirements were provided in the regulations 5 years ago.

It is also proposed to remove the service pressure rating limitation specified for certain cylinders that may be visually inspected thus extending the range of cylinders within the class eligible for visual inspection in place of hydrostatic retesting. It appears safe and reasonable to qualify higher service pressure cylinders for the visual inspection provisions afforded the same type cylinder marked with a lower service pressure in the services described in § 173.34(e) (10).

The Board believes that it is timely to prescribe specific requalification requirements for cylinders in the service of commodities classified as corrosive liquids prior to their use for compressed gases. The Board further believes that good operating practices should normally dictate that cylinders used for corrosive liquids per se be confined to that service. However, it is aware that under certain circumstances it is feasible to employ cylinders in dual service provided adequate safeguards are taken to ascertain the integrity of the pressure vessel in a charged condition. The regulations prescribe the use of certain specification cylinders for various corrosive

liquids, e.g., § 173.247a for vanadium tetrachloride, § 173.251 for boron trichloride, and § 173.283 for bromine trifluoride. Therefore, certain retest and inspection requirements are proposed to preclude the use of cylinders that have performed satisfactorily in a nonpressure service but may be questionable as sound vessels for compressed gases.

On occasion in the past, the significance of the term "owner" as it relates to the safe shipment of compressed gas in cylinders has been questioned. The Board believes that the ownership requirement in § 173.301(b) is a positive safety factor and that a charged compressed gas cylinder must not be shipped unless it was charged by or with the consent of the owner of the cylinder. Accordingly, for the sake of clarity and to be consistent with accepted industry practice, it is proposed to specify that the term "owner" include a lessor or other similar person in legal possession of the container.

Certain editorial adjustments are also included to correlate the substantive changes proposed.

In consideration of the foregoing, it is proposed to amend 49 CFR §§ 173.34 and 173.301 as follows:

(A) In § 173.34 subparagraph (a) (1) would be amended, (a) (3) would be amended and redesignated paragraph (b); (b) would be redesignated (c) (3) (i); the introductory text of paragraph (c) would be amended; (c) (2) would be deleted; (c) (3) would be redesignated (c) (3) (ii); (c) (4) would be redesignated (c) (2); (c) (5) would be deleted; paragraph (e) table and subparagraph (e) (6) would be amended; (e) (9) would be amended by inserting "DOT-4E" following "DOT-4BW" in the first sentence, "\$ 173.68" would be inserted following § 173.61 within the parentheses, the last sentence would be deleted; (c) (10) table would be amended and the last sentence of the paragraph would be deleted; (e) (11), (e) (15) would be amended; (e) (16) would be added as follows:

§ 173.34 Qualification, maintenance and use of cylinders.

(a) \* \* \*

(1) No person may charge or fill a cylinder unless it is as specified in this Part and Part 178 of this chapter. Cylinders that leak, are bulged, have defective valves or safety devices, bear evidence of physical abuse, fire or heat damage, or detrimental rusting or corrosion, must not be used unless they are properly repaired and requalified as prescribed in these regulations.

(b) *Grandfather clause.* A cylinder in domestic use previous to the date upon which the specification therefor was first made effective in these regulations may be used if the cylinder has been properly tested and otherwise complies with the requirements applicable for the gas with which it is charged.

(c) *Cylinder marking.* All required markings on each cylinder must be maintained so that they are legible. Retest



markings and illegible original markings may be reproduced by stamping on metal plates which must be permanently secured to the cylinder.

(2) When the space originally provided for dates of subsequent retests becomes filled, the stamping of additional test dates into the external surface of footrings of cylinders is authorized.

(3) Cylinder markings must not be changed except as follows:

(i) Marked service pressure may be changed only upon application to the Bureau of Explosives and receipt of written instructions as to the procedure to be followed. Such a change is not authorized for cylinders which have failed to pass the prescribed periodic hydrostatic retest unless they are reheat treated and requalified in accordance with the requirements of this section.

(ii) Changes may be made in serial numbers and in the identification symbols by the owners. Identification symbols must be registered and approved by the Bureau of Explosives. Serial numbers and identification symbols may be changed only by owners upon their receipt of written approval from the Bureau of Explosives. The request for approval must identify the existing markings including serial numbers) that correspond with the proposed new markings.

(e) \* \* \*

Specification under which cylinder was made	Minimum retest pressure (p.s.i.)	Retest period (years)
(change)		
DOT-3A, 3AA.....	$\frac{5}{8}$ times service pressure, except noncorrosive service (see § 173.34(e)(10)).	5 or 10 (see § 173.34(e)(11) and (e)(15)).
DOT-4E.....	2 times service pressure, except noncorrosive service (see § 173.34(e)(10)).	5.
DOT-9.....	400 p.s.i. (maximum 600 p.s.i.)	5.
(add)		
DOT-3AX, 3AAX.....	$\frac{5}{8}$ times service pressure	5.
* * *		

(NOTE 1 remains unchanged.)

(6) Each cylinder passing reinspection and retest must be marked with the date (month and year), plainly and permanently stamped into the metal of the cylinder or on a metal plate which must be permanently secured to the cylinder. For example, "4-70" for April 1970. The

dash between the month and year figures may be replaced by the mark of the testing or inspecting agency. Stamping must be in accordance with marking requirements of the specification. Dates of the previous tests must not be obliterated.

(10) \* \* \*

Cylinders made in compliance with—	Used exclusively for—
DOT-4, DOT-3A, DOT-3AA, DOT-3A480X, DOT-4A, DOT-4AA480.	Anhydrous ammonia of at least 99.95% purity.
DOT-3A, DOT-3AA, DOT-3A480X, DOT-3B, DOT-4B, DOT-4BA, DOT-4BW, ICC-26-240, <sup>1</sup> ICC-26-300. <sup>1</sup>	Butadiene, inhibited, which is commercially free from corroding components.
DOT-3A, DOT-3A480X, DOT-3AA, DOT-3B, DOT-4A, DOT-4AA480, DOT-4B, DOT-4BA, DOT-4BW.	Cyclopropane gas which is commercially free from corroding components.
DOT-3A, DOT-3AA, DOT-3A480X, DOT-4B, DOT-4BA, DOT-4BW, DOT-4E.	Fluorinated hydrocarbons and mixtures thereof which are commercially free from corroding components.
DOT-3A, DOT-3AA, DOT-3A480X, DOT-3B, DOT-4B, DOT-4BA, DOT-4BW, DOT-4E, ICC-26-240, <sup>1</sup> ICC-26-300. <sup>1</sup>	Liquefied hydrocarbon gas which is commercially free from corroding components.
DOT-3A, DOT-3AA, DOT-3A480X, DOT-3B, DOT-4B, DOT-4BA, DOT-4BW, DOT-4E, ICC-26-240, <sup>1</sup> ICC-26-300. <sup>1</sup>	Liquefied petroleum gas which is commercially free from corroding components.
DOT-3A, DOT-3AA, DOT-3B, DOT-4B, DOT-4BA, DOT-4BW.	Anhydrous mono, di, trimethylamines which are commercially free from corroding components.

<sup>1</sup> Use of existing cylinders authorized, but new construction not authorized.

(11) Cylinders made in compliance with specification DOT-3A, DOT-3A480X, or DOT-4AA480 used exclusively for anhydrous ammonia, commercially free from corroding components, and protected externally by suitable corrosion resisting coatings (such as painting, etc.) may be retested every 10 years instead of every 5 years.

(15) Cylinders made in compliance with specification DOT-3A or 3AA, not exceeding 125 pounds water capacity and removed from any cluster, bank, group, rack, or vehicle each time they are filled, may be retested every 10 years instead of every 5 years, provided each cylinder complies with all of the following:

(i) The cylinder is not over 35 years old when it is retested;

(ii) Cylinders are used exclusively for: oxygen, nitrogen, argon, hydrogen, helium, neon, krypton, xenon, air, nitrous oxide, cyclopropane, ethylene, and permitted mixtures thereof (see § 173.301 (a)) and permitted mixtures of these gases with up to 30 percent by volume of carbon dioxide.

(iii) Cylinders are used exclusively for commodities having dewpoints at or below minus 52° F. at 1 atmosphere. Prior to each refill, cylinders must be subjected to, and pass, the hammer test specified in CGA Pamphlet C-8.

(iv) Cylinders currently in compliance with subdivisions (i), (ii), and (iii) of this subparagraph but which have not



been confined to the exclusive use service specified since the last required hydrostatic retest must be retested and examined in accordance with the requirements of § 173.302(c) (2), (3), and (4) before the periodic retest interval may be extended to 10 years.

(v) Each cylinder less than 35 years old is stamped with a five pointed star at least 1/4-inch high following the test date. If at any time a cylinder marked with the star is used other than as specified in this paragraph, the star following the most recent test date must be obliterated and subsequent tests made every 5 years.

(16) Cylinders that previously contained a commodity classified as a "corrosive liquid" must not be used for the transportation of any compressed gas unless the following requirements are complied with before the subsequent initial filling with the compressed gas:

(i) Each cylinder must be visually inspected, internally and externally, in accordance with CGA Pamphlet C-6.

(ii) Regardless of the previous test or retest date, each cylinder must be tested by interior hydrostatic pressure and must meet the acceptance criteria as specified in subparagraphs (1), (2), (3), and (4) of this paragraph.

(iii) In addition to the record prescribed in subparagraph (5) of this paragraph, the record of the inspection and test shall include the date (month and year) of the inspection and test; the cylinder identification (including ICC or DOT specification number, registered symbol, serial number, date of manufacture, and ownership symbol); the conditions checked (leakage, corrosion, gouges, dents, or digs in shell or heads, broken or damaged footings, or fire damage); and the disposition of the cylinder (returned to service, returned to the manufacturer for repairs, or scrapped).

(iv) Each cylinder requalified for compressed gas service in accordance with this subparagraph may have its next retest and inspection scheduled from the date of the inspection and retest prescribed herein.

(v) Cylinders that contained any corrosive liquid, for which decontamination methods cannot remove all significant residue or impregnation by the former corrosive content, must not be used for the transportation of any compressed gas.

(B) In § 173.301, paragraphs (a) and (b) would be amended as follows:

§ 173.301 General requirements for shipment of compressed gases in cylinders.

(a) *Gases capable of combining chemically.* Cylinders charged with compressed gas must not contain gases or materials that are capable of combining chemically with each other or with the cylinder material so as to endanger their serviceability. See § 173.34(e)(16) regarding the requalification of cylinders that previously contained a corrosive liquid.

(b) *Ownership of container.* A container charged with a compressed gas may not be shipped unless it was charged by or with the consent of the owner of the container. For the purpose of this subpart, the word "owner" includes a lessor or other similar person in legal possession of the container.

Interested persons are invited to give their views on this proposal. Communications should identify the docket number and be submitted in duplicate to the Secretary, Hazardous Materials Regulations Board, Department of Transportation, 400 Sixth Street SW., Washington, DC 20590. Communications received on or before April 6, 1971, will be considered before final action is taken on the proposal. All comments received will be available for examination by interested persons at the Office of the Secretary, Hazardous Materials Regulations Board, both before and after the closing date for comments.

This proposal is made under the authority of sections 831-835, title 18, United States Code, section 9 of the Department of Transportation Act (49 U.S.C. 1657), and title VI and section 902(h) of the Federal Aviation Act of 1968 (49 U.S.C. 1421-1430 and 1472(h)).

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W. M. BENKERT,  
Captain, U.S. Coast Guard, by  
direction of the Commandant,  
U.S. Coast Guard.

CARL V. LYON,  
Acting Administrator,  
Federal Railroad Administration.

ROBERT A. KAYE,  
Director, Bureau of Motor Car-  
rier Safety, Federal Highway  
Administration.

SAM SCHNEIDER,  
Board Member for the  
Federal Aviation Administration.  
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